

Testimony of

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“Hot Fuels – The Impact on Commercial Transactions of the Thermal
Expansion of Gasoline”

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Introduction

Chairman Kucinich, Ranking Member Issa, and Members of the Subcommittee, thank you for the opportunity to testify today on “Hot Fuels– The Impact on Commercial Transactions of the Thermal Expansion of Gasoline.” I look forward to discussing the work the National Institute of Standards and Technology (NIST) does to establish uniformity in weights and measures requirements and practices for the U.S. economy -- and how the thermal expansion of gasoline relates to compensation issues in the market place.

National Conference on Weights and Measures

NIST has no weights and measures regulatory authority. Instead, NIST fosters efficient and equitable transactions in the domestic and global marketplace through sound science to enable sound policies. In this case, NIST provides technical guidance to the National Conference on Weights and Measures (NCWM). Established in 1905, the NCWM serves as a forum for the development of weights and measures requirements and practices in the United States. Membership in the NCWM is open to all interested parties including weights and measures regulatory officials, device manufacturers and users, and consumers. Any individual may provide testimony on an agenda item, but only regulatory officials are allowed to vote on adoption of an agenda item.

NIST provides three types of technical weights and measures information to the states:

1. Requirements for equipment (NIST Handbook 44)
2. Model regulations (NIST Handbook 130)
3. Test procedures (NIST Handbook 133)

Handbooks 44 and 130 take on the effect of law when they are adopted by reference in state law, rule, or regulation. Federal agencies such as the U.S. Department of Agriculture (USDA) and the Food and Drug Administration (FDA) also adopted NIST Handbooks 44 and 133. NIST provides technical guidance on the requirements in Handbook 44 and 130; however, each state has the final decision on how the requirements are implemented and enforced.

Temperature Compensation

For over 30 years, temperature compensation has been discussed and debated in the weights and measures community. NIST has been in the middle of the discussion, providing technical advice and information as evidenced by the 1979 publication of our report: “Symposium on Temperature Compensated Volumes in the Sale of Petroleum Products.”

So what is temperature compensation? Temperature compensation as it relates to the sale of petroleum is an adjustment made that assures that each gallon of fuel sold contains the same energy content. To put it simply, energy per unit of fuel is measured at 60 degrees Fahrenheit and when the external temperature is warmer it causes the fuel to expand. A

warm gallon of gas does not provide as much energy as a cold one. That is because when that cold gallon of gas is warmed, its volume expands. To compensate for this phenomenon, weights and measures officials may rely on formulas or mechanical means to compensate for temperature differences. States may choose their preferred implementation. With automatic temperature compensation, the measuring device on an application adjusts the volume indicated for any delivery to a reference temperature. For petroleum products, the reference temperature is 60 degrees Fahrenheit – which was established in the 1920s by the then National Bureau of Standards and American Petroleum Institute. Some states specify that a gallon of gasoline is defined as 231 cubic inches at 60 degrees. The state of Hawaii has adopted an alternate reference temperature of 80 degrees Fahrenheit for petroleum. Because of Hawaii's tropical climate, the temperature of gasoline will not vary by more than a few degrees. The rest of the states have more variable climates, so the 60 degree reference makes more sense for them.

In some states, compensating for the temperature of refined petroleum products being sold has taken place at the wholesale level -- but not at the retail gas pump (diesel included) or for deliveries of home heating fuel. Some states prohibit temperature compensation at retail and some states prohibit temperature compensation anywhere in the petroleum distribution chain. Most states require temperature compensation for certain products, such as for liquefied petroleum gas (LPG) sales, or propane for home heating, but not necessarily for other products.

In 2000 a delegate from the State of Oregon, through the Western Weights and Measures Association, submitted an item to the NCWM Specifications and Tolerances Committee to recognize temperature compensation in NIST Handbook 44 for vehicle-tank meter applications. These include meters installed on home heating fuel delivery trucks. The Specifications and Tolerances committee is made up of weights and measures officials with some expertise in the design and operation of commercial devices. As mentioned earlier NIST/WMD serves as technical advisor to the Specifications and Tolerances committee.

After two years of committee development, the issue became a voting item on the Committee's agenda in 2002. At the NCWM Annual Meeting, the conference could not reach an agreement during the voting process. Because the NCWM is a consensus organization, the item was returned to the Specifications and Tolerances Committee for further development. The same result occurred at the conference the following two years. The item has remained as an information item on the Committee's Agenda since that time. In 2004, an item was submitted to the NCWM Laws and Regulations Committee proposing a change to the Uniform Regulation for the Method of Sale of Commodities to require temperature compensation in certain applications such as heating oil tanker trucks, loading rack meters at wholesale gasoline, diesel or even ethanol tank farms, and high volume (truck stop) dispensers. The proposal was modified in January 2007 to recognize voluntary temperature compensation at all levels and is currently a voting item on the committee agenda that is expected to be taken up in July 2007. If adopted this would permit temperature compensation adjustment at additional levels of the distribution chain, but not mandate it.

As part of NIST's role as technical advisor to the NCWM Specifications and Tolerances Committee and in an effort to aid weights and measures officials in making a technically sound decision on the issue, in 2004 NIST developed a presentation on technical aspects of the impact of temperature compensation on the measurement and testing of petroleum products. The presentation included:

- An explanation of temperature compensation and a history of temperature compensation issues addressed by NCWM
- A summary of changes in handling and storage of refined petroleum product in the marketplace, such as single versus double walled tanks and electronic versus mechanical meters.
- A review of the application of temperature compensation to petroleum volume data showing average fuel storage tank temperatures in the U.S. and possible effect on petroleum measurement. The data on storage tank temperatures, collected by a manufacturer of tank monitoring equipment, over a two year period indicated that the average temperature of product in below ground tanks across the U.S. was 64.7 degrees Fahrenheit.
- Examples of automatic temperature compensation equipment
- Effects of temperature on product and test equipment
- Current and proposed requirements for temperature compensation
- Test procedures and equipment for testing devices with automatic temperature compensation

The presentation was given at various weights and measures meetings in 2004 and 2005. NIST recommended that this information be considered during future discussions of implementation of temperature compensation at various levels in the petroleum distribution chain.

Conclusion

When state or local weights and measures regulators have mandated compensating for temperature in the sale of petroleum products, it ensures that the energy content of a gallon of gas is the same regardless of the supplier.

NIST serves only as a technical advisor and has no voting role in the process of the NCWM, the organization that provides a framework to individual jurisdictions. NIST analysis, however, shows that temperature compensation can be used to ensure accurate measures of energy content in fuels being sold. We will continue to work with state and local officials, industry, and the public to ensure informed decision making and to enhance the reliability of measurements in the market place.

Thank you for the opportunity to testify before you today. I would be happy to answer any questions the Subcommittee might have.